

Precipitation Products in the GOES-R Proving Ground

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In preparation for the launch of GOES-R, a suite of satellite products designed to assist in the forecasting of precipitation is being developed. These products may be loosely divided into two categories based upon the amount of subsequent analysis needed by the forecaster to produce a precipitation forecast, with the first group needing the greater forecaster input. Six GOES-R products will be discussed, three in each of the two groups.

The first product of the first group is the RGB Airmass Product. Based on both the existing GOES sounder and Meteosat Second Generation satellite inputs, this product combines water vapor, ozone, and temperature data to create an image in which the colors are associated with different airmass characteristics such as temperature and moisture. Originally developed by EUMETSAT for monitoring extra-tropical cyclone development and evolution, the RGB Airmass Product also performs well at lower latitudes. The second product is a GOES-R total precipitable water (TPW) product. In the development of this product, a current polar-orbiting TPW satellite product, Morphed Integrated Microwave Imagery at CIMSS (MIMIC-TPW) will be used. The final product in the first category will use GOES-R measurements of TPW to create a product based on a specific atmospheric feature—the atmospheric river, a region of high water vapor transport within the strong poleward flow ahead of cold fronts which can be responsible for heavy rains along the West Coast.

The first product of the second group is an extension of the Blended TPW product developed at CIRA. The TPW is used along with the component of the wind parallel to the height gradient of the topography to create the Orographic Rain Index (ORI). This product is designed to indicate where the potential for short-term heavy orographic rain exists. The second product is the Rainfall Potential Algorithm, which uses the current and immediately previous fields of rainfall rate inferred from satellite measurements at several wavelengths to produce extrapolation-based forecasts of rainfall accumulation over the next 3 hours at the satellite pixel scale. The third product is the Rainfall Probability Algorithm, which uses the outputs and intermediate products of the Rainfall Potential Algorithm to forecast the probability of rainfall accumulating ≥ 1 mm over the next 3 hours at the satellite pixel scale.

As a part of the GOES-R Proving Ground, the development of these products includes testing by the user community.